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## **Optimizing multi-purpose reservoir operation using particle swarm intelligence**

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### **ABSTRACT**

Developing an efficient multi-objective reservoir operation policy is one of the most challenging water resources tasks due to big number of involved parameters besides the question of proper system representation. Therefore, the aim of the paper is to apply Particle Swarm Optimization (PSO) technique to optimal operation of the Atbara River basin reservoir system. An objective function is defined to minimize the squared difference between targeted and generated hydropower as well as irrigation demands to be solved by a set of calibrated Particle Swarm Optimization (PSO) then applied in Girba multi-purpose reservoir. The results showed tangible improvement in power production up to 15% increasing with a good irrigation demands satisfaction. Three performance measures of reliability, resilience, and vulnerability have been applied based on model outputs and required release values that satisfy the system's demands. All measures indicated the improvement of system's satisfaction performance with increased reliability to 97% instead of current 86%.